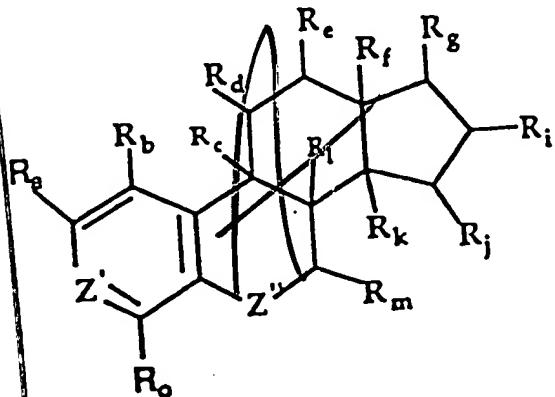


Claims

1       1. A method for treating a mammalian disease  
2       characterized by abnormal cell mitosis, said method  
3       comprising administering to a mammal a cell-mitosis-  
4       inhibiting compound of the formula below, said compound  
5       being administered in an amount sufficient to inhibit cell  
6       mitosis:

7



8       wherein:

9       I.      R<sub>a</sub>-R<sub>o</sub> are defined as follows:  
10       A)     each R<sub>a</sub>, R<sub>b</sub>, R<sub>c</sub>, R<sub>d</sub>, R<sub>e</sub>, R<sub>f</sub>, R<sub>i</sub>, R<sub>j</sub>, R<sub>k</sub>, R<sub>l</sub>,  
11       R<sub>m</sub>, R<sub>o</sub>, independently is -R<sub>1</sub>, -OR<sub>1</sub>,

15 or

B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_f$ ,  $R_k$ ,  $R_l$ ,  $R_o$ , independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and each  $R_d$ ,  $R_e$ ,  $R_i$ ,  $R_j$ ,  $R_m$ , independently is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ; and  $R_g$  is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ , or  $-C\equiv CH$ ;

23 and

24 II.  $z'$  is defined as follows:

25  
26  
27 A)  $z'$  is  $X$ , where  $X$  is  $>\text{COR}_1$ ,  $>\text{CC}-\text{R}_1$ ,  
28  $>\text{CC}-\text{OR}_1$ ,  $>\text{CC}-\text{R}_1$ ,  $>\text{CC}-\text{OR}_1$ ;  
29  
30

31 or

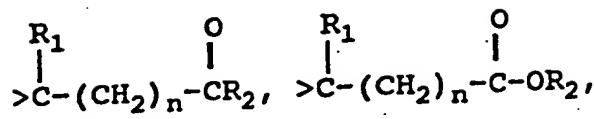
38 and

30. **III** "Z" is defined as follows:

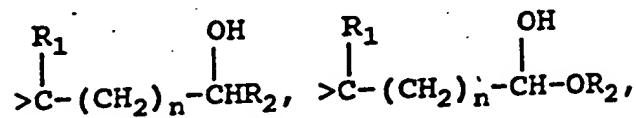
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A)  $Z''$  is Y, where Y is  $-O-$ ,  $-N-$ ,  $>CHR_1'$

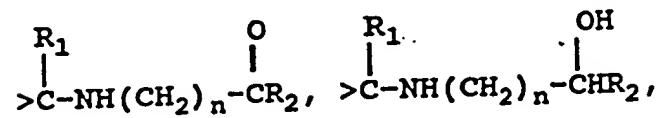
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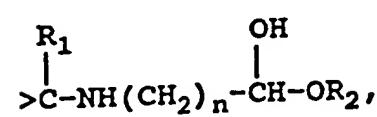
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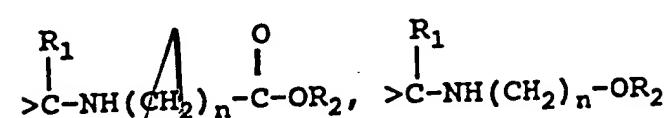
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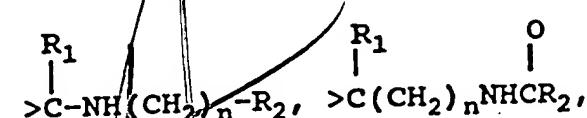
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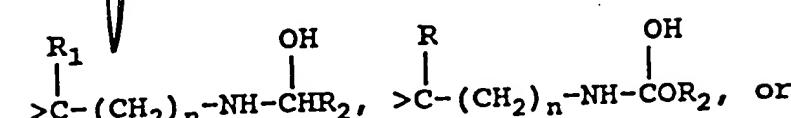
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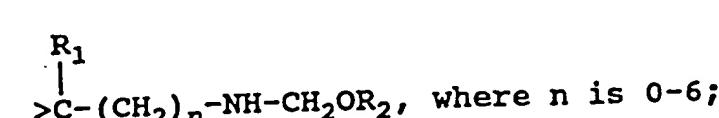
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73 or

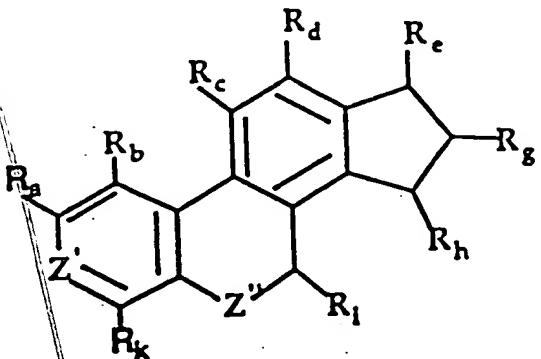
B)  $Z''$  is  $-Y-CH-$  or  $-CH-Y-$  where  $R_p$   
 $R_p$        $R_p$   
is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ;

78 and

IV. provided that when each  $R_b, R_c, R_d, R_e, R_i, R_j, R_k$ ,  
 $R_l, R_m$  and  $R_o$  is H;  
 $R_f$  is  $-CH_3$ ;

82                   R<sub>g</sub> is -OH;  
83                   Z' is >COH; and  
84                   Z" is >CH<sub>2</sub>;  
85                   then R<sub>a</sub> is not -H;  
86                   where, in each formula set forth above, each R<sub>1</sub> and R<sub>2</sub>  
87                   independently is -H, or substituted or unsubstituted alkyl,  
88                   alkenyl or alkynyl group of 1-6 carbons.

1                   2. A method for treating a mammalian disease  
2                   characterized by abnormal cell mitosis, said method  
3                   comprising administering to a mammal a cell-mitosis-  
4                   inhibiting compound of the formula below, said compound  
5                   being administered in an amount sufficient to inhibit cell  
6                   mitosis:



8 wherein:

9 I.  $R_a$ - $R_k$  are defined as follows:

10 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_k$   
11 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
12  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_e$  is  $-R_1$ ,  $-OR_1$ ,  
13  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

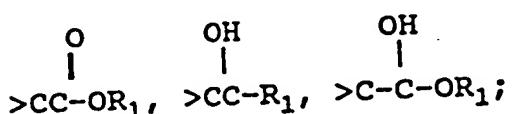
14 or

15 B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_k$ , independently is  
16  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  
17  $-I$ ; and each  $R_{eg}$ ,  $R_h$ ,  $R_i$ , independently is  
18  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-Br$ , or  
19  $-I$ ; and  $R_e$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
20  $-F$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

21 and

22 II.  $z'$  is defined as follows:

23 A)  $z'$  is  $X$ , where  $X$  is  $>COR_1$ ,  $>CC-R_1$ ,  
24



26 or

27 B)  $z'$  is  $=C-X'-$  or  $-X'-C=$ , where  $R_n$   
28

29 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ,  
30 and  $X'$  is  $X$ , as defined above;  
31 or  $X'$  is also  $>C=O$ ;

32 and

33 III.  $z''$  is defined as follows:

34 A)  $z''$  is  $Y$ , where  $Y$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,  
35

41

$$>\text{C}=\text{O}, \quad >\text{C}-\text{(CH}_2\text{)}_n\text{OR}_2,$$

44

$$>C-(CH_2)_n-CR_2, >C-(CH_2)_n-C-OR_2,$$

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48  
49

$$>C-\overset{R_1}{\underset{|}{\overset{\text{CH}_2}{\text{---}}}}_n-\overset{\text{OH}}{\underset{|}{\overset{\text{---}}{\text{CH}}}}\text{R}_2, >C-\overset{R_1}{\underset{|}{\overset{\text{CH}_2}{\text{---}}}}_n-\overset{\text{OH}}{\underset{|}{\overset{\text{---}}{\text{CH}}}}\text{OR}_2,$$

50  
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$$>C-NH(CH_2)_n-CHR_2, >C-O-CHR_2, >C-NH(CH_2)_n-CH(OH)R_2,$$

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$$>C-NH(CH_2)_n-CH-OH$$

56  
57  
58

$$>C-NH(CH_2)_n-C-OR_2, >C-NH(CH_2)_n-OR_2$$

59  
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$$\begin{array}{c} \text{R}_1 \\ | \\ >\text{C}-\text{NH}(\text{CH}_2)_n-\text{R}_2 \end{array}$$

6  
6  
6

$$>C(CH_2)_nNHCOR_2, >C-(CH_2)_n-NHC-OR_2,$$

6

$$>C-(\text{CH}_2)_n-\text{NH}-\text{CHR}_2, \quad >C-(\text{CH}_2)_n-\text{NH}-\text{COR}_2, \quad \text{or}$$

6  
7

$$\begin{array}{c} \text{R}_1 \\ | \\ >\text{C}-\text{(CH}_2\text{)}_n-\text{NH-CH}_2\text{OR}_2, \text{ where } n \text{ is } 0-6; \end{array}$$

7

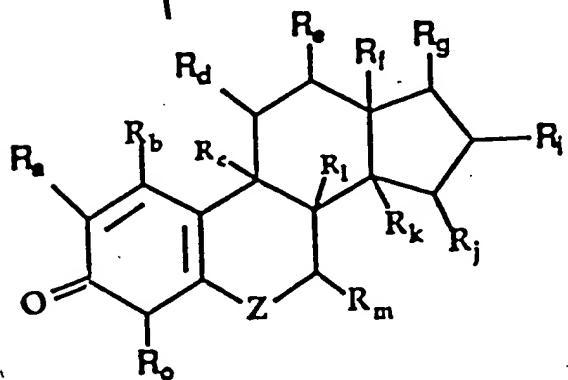
v)  $\text{Z}'$  is  $-\text{Y}-\text{CH}-$  or  $-\text{CH}-\text{Y}-$ , where  $\text{R}_p$  is

• 100 •

$R_p$        $R_p$   
 $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I;$

76 where, in each formula set forth above, each  $R_1$  and  $R_2$   
77 independently is -H, or substituted or unsubstituted alkyl,  
78 alkenyl or alkynyl group of 1-6 carbons.

1 3. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:



8 wherein:

9 I.  $R_a$ - $R_o$  are defined as follows:  
10 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_f$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,  
11  $R_m$ ,  $R_n$  independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  
12  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_g$  is  $-R_1$ ,  
13  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  
14  $-C\equiv CH$ ;

15 or

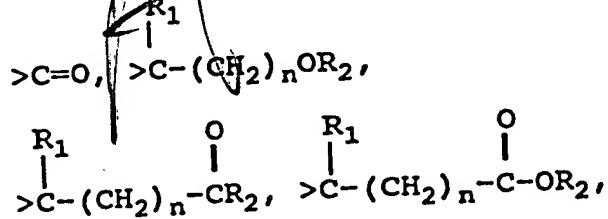
16 B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_f$ ,  $R_k$ ,  $R_l$ , independently  
17 is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  
18 or  $-I$ ; and each  $R_d$ ,  $R_e$ ,  $R_i$ ,  $R_j$ ,  $R_m$ ,  $R_o$   
19 independently is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  
20  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_g$  is  $=O$ ,  
21  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$   
22 or  $-C\equiv CH$ ;

23 and

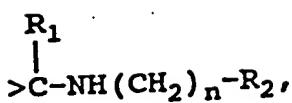
24 II.  $Z$  is defined as follows:

25 A)  $Z$  is  $\text{Y}$ , where  $\text{Y}$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

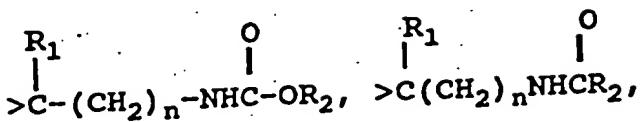
26  $>C=O$ ,  $>C-(CH_2)_nOR_2$ ,



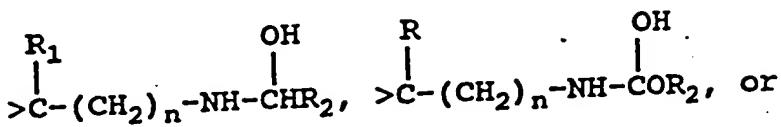
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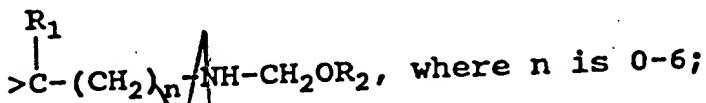
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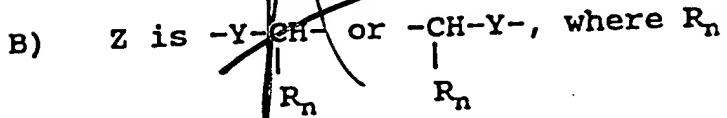
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62 or

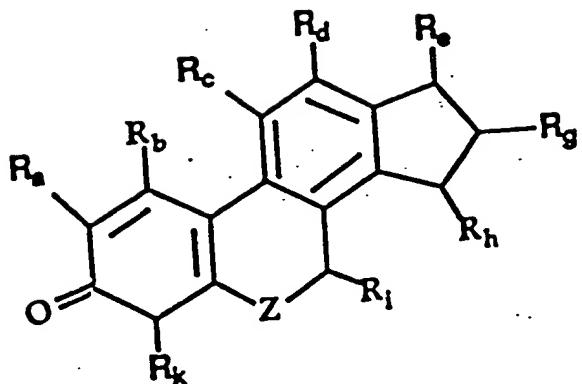


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is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;  
where, in each formula set forth above, each  $R_1$  and  $R_2$   
independently is  $-H$ , or substituted or unsubstituted alkyl,  
alkenyl or alkynyl group of 1-6 carbons.

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4. A method for treating a mammalian disease  
characterized by abnormal cell mitosis, said method  
comprising administering to a mammal a cell-mitosis-  
inhibiting compound of the formula below, said compound  
being administered in an amount sufficient to inhibit cell  
mitosis:



7 wherein:

8 I.  $R_a - R_k$  are defined as follows:

9 A) ~~each  $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$~~   
 10 independently is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
 11  $-F, -NHR_1, -Br, \text{ or } -I$ ; and  $R_e$  is  $-R_1, -OR_1,$   
 12  $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I \text{ or } -C\equiv CH$ ;

13 or

14 B) ~~each  $R_a, R_b, R_c, R_d$~~ , independently is  $-R_1,$   
 15  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$   
 16 and each  $R_g, R_h, R_i, R_k$  independently is  
 17  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$   
 18 or  $-I$ ; and  $R_e$  is  $=O, -R_1, -OR_1, -OCOR_1,$   
 19  $-SR_1, -F, -NHR_1, -Br, -I \text{ or } -C\equiv CH$ ;

20 and

21 II.  $Z$  is defined as follows:

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23  
24

A) Z is Y, where Y is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

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26  
27

$>C=O$ ,  $>C-(CH_2)_nOR_2$ ,

28  
29  
30

$>C-(CH_2)_n-CR_2$ ,  $>C-(CH_2)_n-C-OR_2$ ,

31  
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33

$>C-(CH_2)_n-CHR_2$ ,  $>C-(CH_2)_n-CH-OH$ ,  $OR_2$ ,

34  
35  
36

$>C-NH(CH_2)_n-CR_2$ ,  $>C-NH(CH_2)_n-CHR_2$ ,

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$>C-NH(CH_2)_n-CH-OH$ ,  $OR_2$ ,

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$>C-NH(CH_2)_n-C-OR_2$ ,  $>C-NH(CH_2)_n-OR_2$ ,

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$>C-NH(CH_2)_n-R_2$ ,  $>C(CH_2)_nNHCR_2$ ,

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$>C-(CH_2)_n-NHC-OR_2$ ,

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$>C-(CH_2)_n-NH-CHR_2$ ,  $>C-(CH_2)_n-NH-COR_2$ , or

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$>C-(CH_2)_n-NH-CH_2OR_2$ , where n is 0-6;

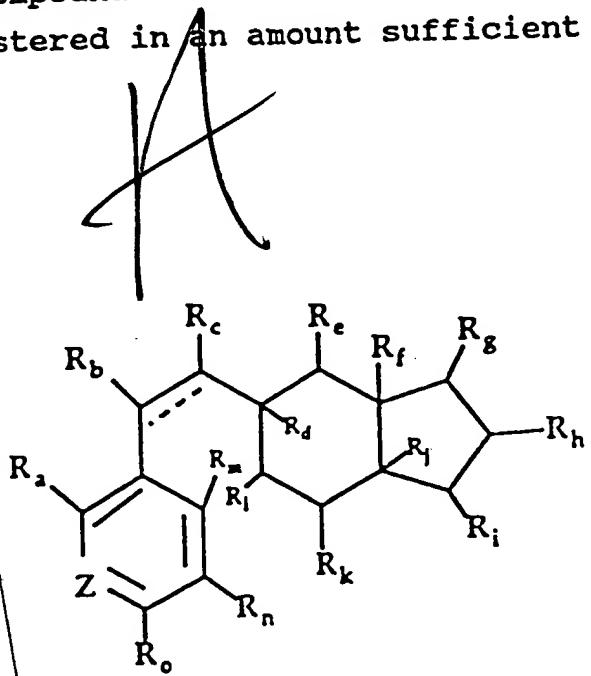
55 or

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B) Z is  $-Y-CH-$  or  $-CH-Y-$ , where  $R_n$

59 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;  
60 where, in each formula set forth above, each  $R_1$  and  $R_2$   
61 independently is  $-H$ , or substituted or unsubstituted alkyl,  
62 alkenyl or alkynyl group of 1-6 carbons.

1        5. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:



8 wherein:

9 I.  $R_a - R_o$  are defined as follows:

15 or

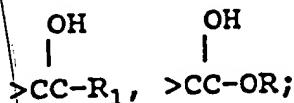
16 B) each  $R_a$ ,  $R_d$ ,  $R_f$ ,  $R_j$ ,  $R_m$ ,  $R_n$ ,  $R_o$   
17 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCR_1$ ,  $-SR_1$ ,  
18  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and each  $R_b$ ,  $R_c$ ,  $R_e$ ,  
19  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$  independently is  $=0$ ,  
20  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  
21  $-I$ ; and  $R_i$  is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
22  $-F$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

23 or

24 C) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_f$ ,  $R_j$ ,  $R_m$ ,  $R_n$ ,  $R_o$   
25 independently is  $-R_1$ ,  $-OR_1$ ,  $OCR_1$ ,  $-SR_1$ ,  $-F$ ,  
26  $-NHR_2$ ,  $-Br$ ,  $-I$  and each  $R_e$ ,  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$   
27 independently is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  
28  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=0$ ,  
29  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-Br$ ,  $-I$  or  
30  $-C\equiv CH$ ;

31 II.  $Z$  is defined as follows:

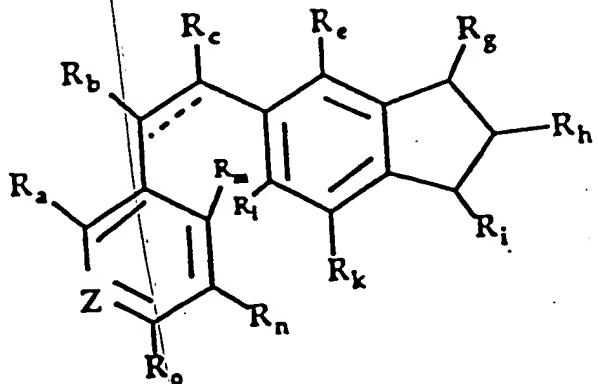
32 A)  $Z$  is  $X$ , where  $X$  is  $>COR_1$ ,  $>CC-R_1$ ,  $>CC-OR_1$ ,



38 or

1               6. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:

7



8 wherein:

9 I.  $R_a$ - $R_o$  are defined as follows:

10 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_e$ ,  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$ ,  $R_m$ ,  $R_n$ ,  
11  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  
12  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_i$  is  $-R_1$ ,  
13  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  
14  $-C\equiv CH$ ;

15 or

16 B) each  $R_a$ ,  $R_e$ ,  $R_l$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently  
17 is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  
18  $-I$  and each  $R_b$ ,  $R_c$ ,  $R_g$ ,  $R_h$  is  $=O$ ,  $-R_1$ ,  
19  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ;  
20 and  $R_i$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  
21  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

22 or

23 C) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_e$ ,  $R_k$ ,  $R_m$ ,  $R_n$ ,  $R_o$   
24 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
25  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ , and each  $R_h$ ,  $R_l$   
26 independently is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  
27  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=O$ ,  
28  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$   
29 or  $-C\equiv CH$ ;

30 and

31 I. z is defined as follows:

32 A) z is X, where X is  $>COR_1$ ,  $>CC-R_1$ ,  $>CC-OR_1$ ,  
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37

38 or

$$\begin{array}{c} O & O \\ | & | \\ OH & OH \\ >CC-R_1, & >CC-OR_1 \end{array}$$

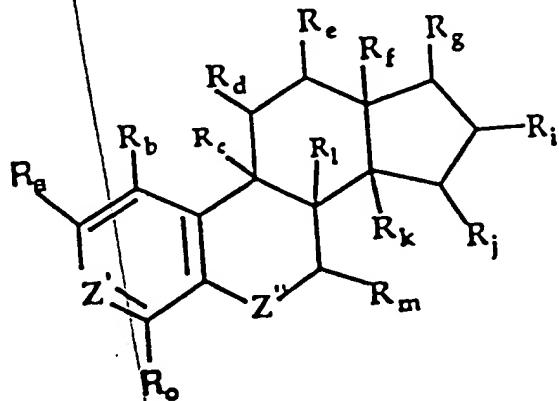
39 B)

40 Z is  $=C-X'-$  or  $-X'-C=$ , where  $R_p$   
41 |  
42 |  $R_p$   
43 |  
44 |  $R_p$

45 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ,  
46 and  $X'$  is  $X$ , as defined above;  
47 or  $X'$  is  $=O$ ;

48 where, in each formula set forth above, each  $R_1$  and  $R_2$   
49 independently is  $-H$ , or substituted or unsubstituted alkyl,  
50 alkenyl or alkynyl group of 1-6 carbons; and the bond  
51 indicated by  $C\dots C$  is absent or, in combination with the  $C-C$   
52 bond is the unit  $HC=CH$ .

1 7. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:  
3



4 wherein:

5 I.  $R_a - R_o$  are derived from  
 6 (A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_f$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,  
 7  $R_m$ ,  $R_o$ , independently is  $-R_1$ ,  $-OR_1$ ,  
 8  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_g$   
 9 is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  
 -I or  $-C\equiv CH$ ;

11 or

(B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_f$ ,  $R_k$ ,  $R_l$ ,  $R_o$ , is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and each  $R_d$ ,  $R_e$ ,  $R_i$ ,  $R_j$ ,  $R_m$ , independently is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ; and  $R_g$  is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

18 and

11. II.  $z'$  is defined as follows:

20  
21 A)  $Z'$  is  $X$ , where  $X$  is  $>\text{COR}_1$ ,  $>\text{CC-R}_1$ ,

26 or

B)  $z'$  is  $=C-X'-$  or  $-X'-C=$ , where  $R_n$

33 and

34 III.  $z''$  is defined as follows:

35  
36  
37

A)  $Z''$  is  $Y$ , where  $Y$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

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39  
40

$>C=O$ ,  $>C-(CH_2)_nOR_2$ ,

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42  
43

$>C-(CH_2)_n-CR_2$ ,  $>C-(CH_2)_n-C-OR_2$ ,

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45  
46

$>C-(CH_2)_n-CHR_2$ ,  $>C-(CH_2)_n-CH-OR_2$ ,

47  
48  
49

$>C-NH(CH_2)_n-CR_2$ ,  $>C-NH(CH_2)_n-CHR_2$ ,

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51  
52

$>C-NH(CH_2)_n-CH-OR_2$ ,

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54  
55

$>C-NH(CH_2)_n-C-OR_2$ ,  $>C-NH(CH_2)_n-OR_2$

56  
57  
58

$>C-NH(CH_2)_n-R_2$ ,  $>C(CH_2)_nNHCOR_2$ ,

59  
60  
61

$>C-(CH_2)_n-NHC-OR_2$ ,

62  
63  
64

$>C-(CH_2)_n-NH-CHR_2$ ,  $>C-(CH_2)_n-NH-COR_2$ , or

65  
66  
67

$>C-(CH_2)_n-NH-CH_2OR_2$ , where  $n$  is 0-6;

68 or

B)  $Z''$  is  $-Y-CH-$  or  $-CH-Y-$  where  $R_p$

72

is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;

73 provided that when:

74 3) each  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,  $R_m$ , is  $-H$ ;  
75  $R_f$  is  $-CH_3$ ;

76

77  $R_g$  is  $-OH$ ,  $-OCCH_3$ ;

78

79  $R_i$  is  $-H$ ,  $-OH$ , or  $=O$ ;

80

81  $R_o$  is  $-H$  or  $-Br$ ;

82

83  $Z'$  is  $>COH$ ; and

84

85 4)  $Z''$  is  $>CH_2$  or  $-OH$ ; then

86

87  $R_a$  is not  $-F$ ,  $-Br$ ,  $-OH$  or  $-H$ ;

88

89 and

90 4) each  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,

91  $R_m$ , is  $-H$ ;

92

93  $R_f$  is  $-CH_3$ ;

94

95  $R_g$  is  $-OH$ ; and

96

97 5)  $Z''$  is  $>CH_2$ ; then

98

99  $Z'$  is not  $>COCH_3$  or  $>COCCH_3$ ; and  
100 each  $R_a$ ,  $R_o$  independently or together are  
101 not  $-OCH_3$  or  $-H$ ;

102

103 and

104 5) each  $R_c$ ,  $R_e$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,  $R_m$ ,  $R_o$  is  $-H$ ;

105

106  $R_a$  is  $-H$  or  $-OCH_3$ ;

107

108  $R_b$  is  $-H$  or  $-CH_3$ ;

109

110  $R_d$  is  $-OH$ ;

111

112  $R_f$  is  $-CH_3$ ;

113

114  $R_g$  is  $=O$ ;

115

116  $R_i$  is  $-OH$ ,  $=O$  or  $-C\equiv CH$ ; and

117

118  $Z''$  is  $>CH_2$ ; then

119

120  $Z'$  is not  $>COH$ ;  $>COCCH_3$ , or  $-H$ ;

121

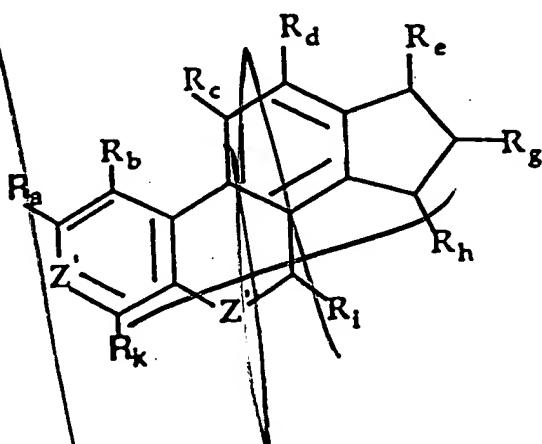
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123

107 where, in each formula set forth above, each  $R_1$  and  $R_2$   
108 independently is -H, or substituted or unsubstituted alkyl,  
109 alkenyl or alkynyl group of 1-6 carbons.

1 8. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I.  $R_a-R_k$  are defined as follows:

6 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_k$   
7 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
8  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_e$  is  $-R_1$ ,  $-OR_1$ ,  
9  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

10 or

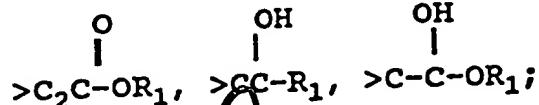
11 B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_k$ , is  $-R_1$ ,  $-OR_1$ ,  
12  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  
13 each  $R_g$ ,  $R_h$ ,  $R_i$ , independently is  $=O$ ,

-R<sub>1</sub>, -OR<sub>1</sub>, -OCOR<sub>1</sub>, -SR<sub>1</sub>, -F, -Br, or -I;  
 and R<sub>e</sub> is =0, -R<sub>1</sub>, -OR<sub>1</sub>, -OCOR<sub>1</sub>, -SR<sub>1</sub>, -F,  
 -Br, -I or -C≡CH;

17 and

18 I.  $z'$  is defined as follows:

A)  $z'$  is  $x$ , where  $x$  is  $>COR_1$ ,  $>C_2C-R_1$ ,



25 or

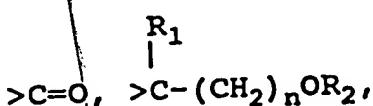
B)  $z'$  is  $=C_1x' -$  or  $-x' - C_1$ , where  $R_n$

is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ,  
 and  $X'$  is  $X$ , as defined above;  
 or  $X'$  is also  $>C=O$ ;

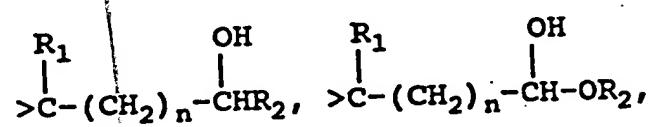
32 and

33 II.  $z''$  is defined as follows:

A)  $Z''$  is Y, where Y is  $-O-$ ,  $-N-$ ,  $>CHR_1$

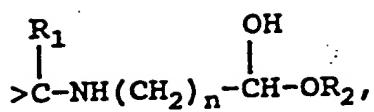


$$>C-(CH_2)_n-CR_2, >C-(CH_2)_n-C-OR_2,$$

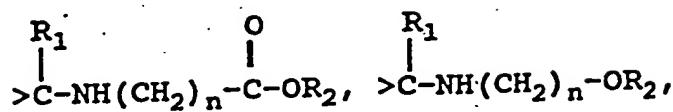


$$>C-NH(CH_2)_n-CR_2, >C-NH(CH_2)_n-CHR_2,$$

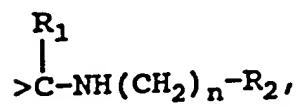
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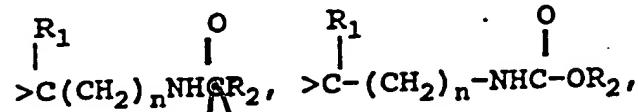
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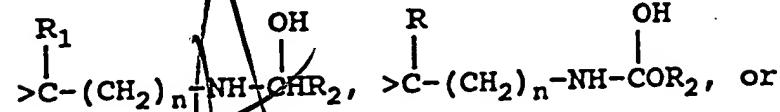
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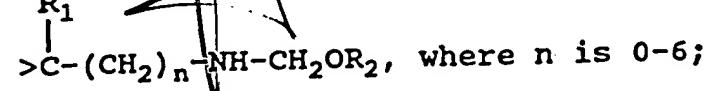
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67 or

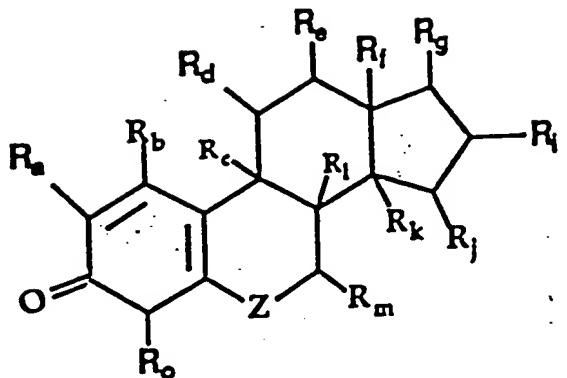
B)  $\text{Z}''$  is  $-\text{Y}-\text{CH}-$  or  $-\text{CH}-\text{Y}-$ , where  $\text{R}_p$  is



$-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$  or  $-\text{I}$ ;

71 where, in each formula set forth above, each  $\text{R}_1$  and  $\text{R}_2$   
72 independently is  $-\text{H}$ , or substituted or unsubstituted alkyl,  
73 alkenyl or alkynyl group of 1-6 carbons.  
74

1           9. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:



### 3 wherein:

4 I.  $R_a - R_b$  are defined as follows:

10 or

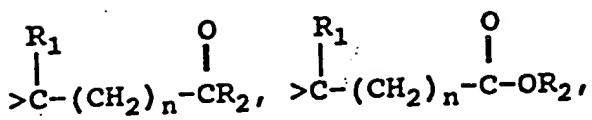
B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_f$ ,  $R_k$ ,  $R_l$ , independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and each  $R_d$ ,  $R_e$ ,  $R_i$ ,  $R_j$ ,  $R_m$ ,  $R_o$  independently is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ ; and  $R_g$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

18 and

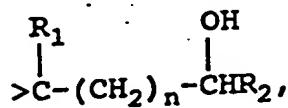
19      III.    Z is defined as follows:

20  $R_1$   
21  
22 A)  $Z$  is  $Y$ , where  $Y$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ .

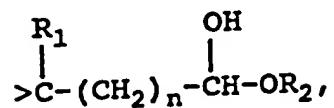
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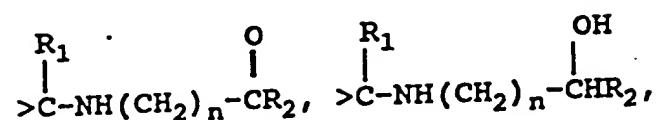
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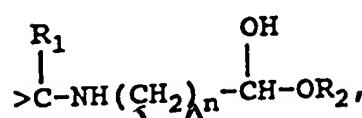
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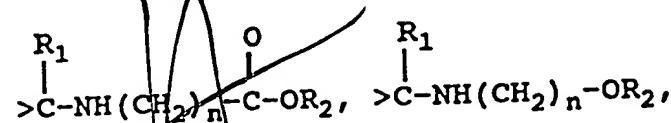
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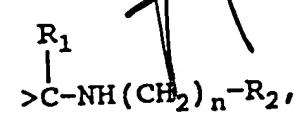
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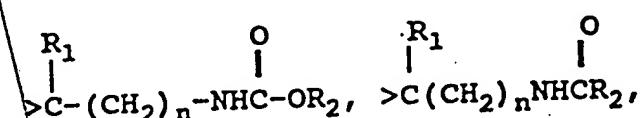
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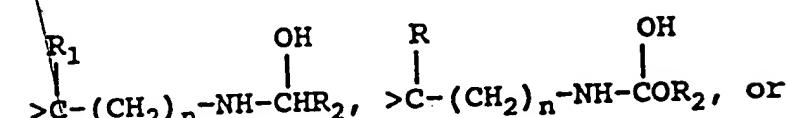
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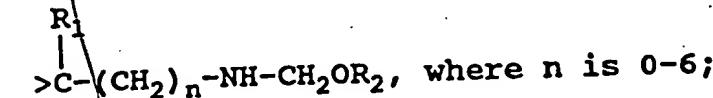
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57 or

B)  $Z$  is  $-Y-CH-$  or  $-CH-Y-$ , where  $R_n$

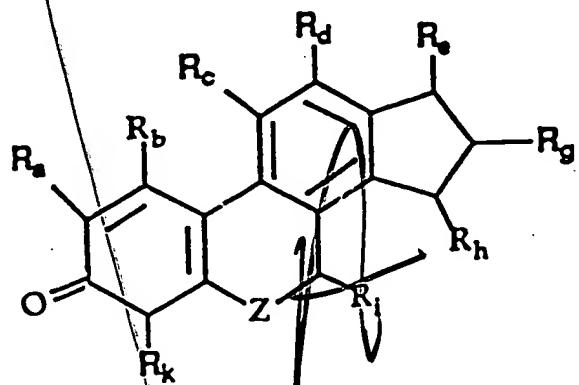
$R_n$  is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ;

61

62 where, in each formula set forth above, each  $R_1$  and  $R_2$   
63 independently is -H, or substituted or unsubstituted alkyl,  
64 alkenyl or alkynyl group of 1-6 carbons.

1 10. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I.  $R_a$ - $R_k$  are defined as follows:

6 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_k$   
7 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
8  $-F$ ,  $-NHR_1$ ,  $-Br$ , or  $-I$ ; and  $R_e$  is  $-R_1$ ,  $-OR_1$ ,  
9  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

10 or

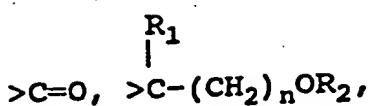
11 B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ , independently is  $-R_1$ ,  
12  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ , or  $-I$ ;  
13 and each  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_k$  independently is  
14  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$   
15 or  $-I$ ; and  $R_e$  is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
16  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

17 II.  $Z$  is defined as follows:

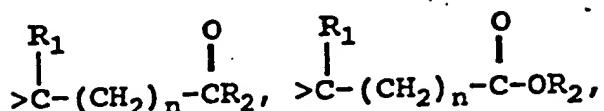
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1)  $z$  is  $Y$ , where  $Y$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

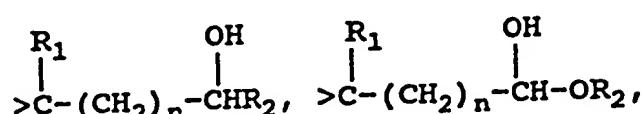
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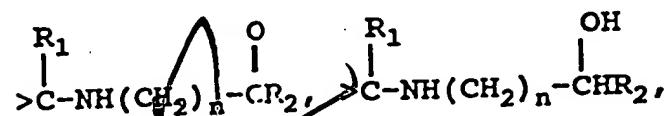
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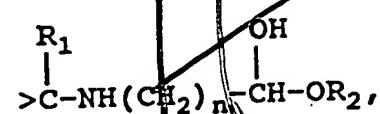
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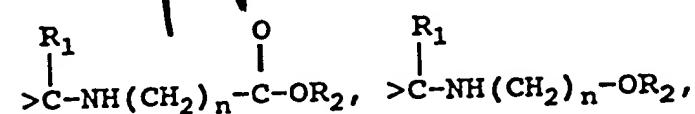
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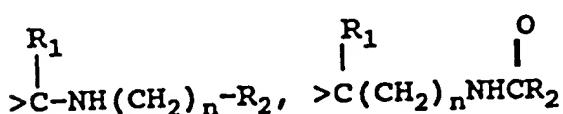
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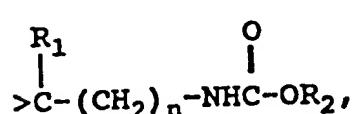
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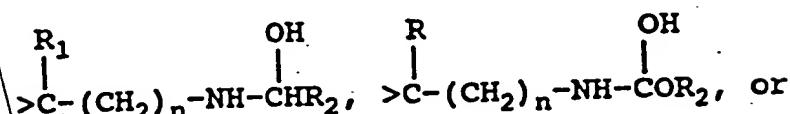
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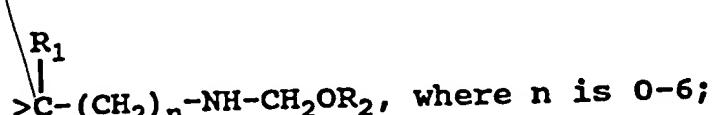
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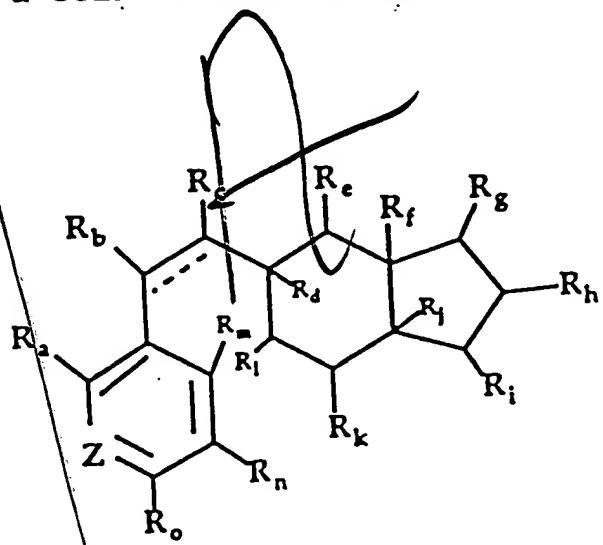


51 or

55 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  
56  $-NHR_2$ ,  $-Br$  or  $-I$ ;

57 where, in each formula set forth above, each  $R_1$  and  $R_2$   
58 independently is -H, or substituted or unsubstituted alkyl,  
59 alkenyl or alkynyl group of 1-6 carbons.

1 11. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:



#### 4 wherein:

5 I.  $R_a$ - $R_o$  are defined as follows:

6                   A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_f$ ,  $R_g$ ,  $R_h$ ,  $R_j$ ,  $R_k$ ,  
7                    $R_l$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  
8                    $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_1$   
9                   is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  
10                   $-I$  or  $-C\equiv CH$ ;

11 or

B)

each  $R_a$ ,  $R_d$ ,  $R_f$ ,  $R_j$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $-OCR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ ; and each  $R_b$ ,  $R_c$ ,  $R_e$ ,  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$  independently is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

19 or

C)

each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_f$ ,  $R_j$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $OCR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ ; and each  $R_e$ ,  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$  independently is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=0$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

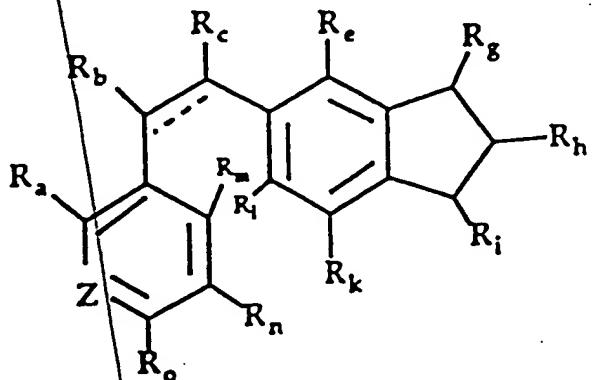
27 and

28 I.  $Z$  is defined as follows:

29 30 31 1)  $Z$  is  $X$ , where  $X$  is  $>COR_1$ ,  $>CC-R_1$ ,  $>CC-OR_1$ ,

32 33 34  $>CC-R_1$ ,  $>CC-OR$ ; or

1                   12. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:



#### 4 wherein:

5 I.  $R_a - R_o$  are defined as follows:

A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_e$ ,  $R_g$ ,  $R_h$ ,  $R_k$ ,  $R_l$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_i$  is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

10 or

B) each  $R_a$ ,  $R_e$ ,  $R_1$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ ; and each  $R_b$ ,  $R_c$ ,  $R_g$ ,  $R_h$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

17 or

c) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_e$ ,  $R_k$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  $OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$ ; and each  $R_g$ ,  $R_h$  independently is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$  or  $-I$ ; and  $R_i$  is  $=O$ ,  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_1$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

25 and

26 II.  $z$  is defined as follows:

27  
28  
29

A)  $Z$  is  $X$ , where  $X$  is  $>\text{COR}_1$ ,  $>\text{CC-R}_1$ ,  $>\text{CC-OR}_1$ ,

30  
31  
32

$$\begin{array}{c} \text{OH} \\ | \\ >\text{CC}=\text{R}_1, \quad >\text{CC}-\text{OR}_1 \end{array}$$

33 OR

B)  $Z$  is  $=C-X'-$  or  $-X'-C=$ , where  $R_p$

39  
40 where, in each formula set forth above, each  $R_1$  and  $R_2$   
41 independently is -H, or substituted or unsubstituted alkyl,  
42 alkenyl or alkynyl group of 1-6 carbons; and the bond  
43 indicated by  $C \cdots C$  is absent or, in combination with the C-C  
44 bond is the unit  $HC=CH$ .

1                   13. The method of claim 1, wherein said  
2 cell-mitosis-inhibiting composition is 2-methoxyestradiol.

1                   14. The method of claim 1, wherein said  
2 cell-mitosis-inhibiting composition is 2-fluoroestradiol.

15. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-bromoestradiol.

16. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-methoxyestrone.

1                   17. The method of claim 1, wherein said cell-  
2                   mitosis-inhibiting composition is 17-ethynylestradiol.

1                   18. The method of claims 1 or 2 wherein said  
2 compound is further characterized in that

12  
13  
14

C)  $Z'$  is  $=C-X'-$  or  $-X'-C=$ ; and  $Z''$  is  $Y$ .  
 $R_n$   $R_n$

1 19. The method of claims 3 or 4 wherein said  
2 compound is further characterized in that  $Z$  is  
3  $-Y-CH-$  or  $-CH-Y-$ .

4  $R_n$   $R_n$   
5

1 20. The method of claims 5 or 6 wherein said  
2 compound is further characterized in that  $Z$  is  
3  $=C-X'-$  or  $-X'-C=$ .

4  $R_p$   $R_p$   
5

1 21. The compound of claims 7 or 8, wherein said  
2 compound is further characterized in that

3 A)  $Z'$  is  $=C-X'-$  or  $-X'-C=$ ; and  
4  $R_n$   $R_n$   
5

6  $Z''$  is  $-Y-CH-$  or  $-CH-Y-$ ; or  
7  $R_p$   $R_p$   
8

9 B)  $Z'$  is  $X$ ; and  $Z''$  is  $-Y-CH-$  or  $-CH-Y-$ ; or  
10  $R_p$   $R_p$   
11

12 C)  $Z'$  is  $=C-X'-$  or  $-X'-C=$ ; and  $Z''$  is  $Y$ .  
13  $R_n$   $R_n$   
14

1 22. The compound of claims 9 or 10, wherein said  
2 compound is further characterized in that  $Z$  is  
3  $-Y-CH-$  or  $-CH-Y-$ .

4  $R_n$   $R_n$   
5

1           23. The compound of claims 11 or 12, wherein said  
2 compound is further characterized in that Z is  
3            $=C-X'- or -X'-C=$ .  
4           |                           |  
5           R<sub>p</sub>                   R<sub>p</sub>

1           24. The method of any one of claims 1-6, wherein at  
2 least one of R<sub>a</sub>→R<sub>p</sub> is -OCH<sub>3</sub>.

1           25. The compound of any one of claims 7-12, wherein  
2 at least one of R<sub>a</sub>→R<sub>p</sub> is -OCH<sub>3</sub>.

*Add  
A1*

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